Listing of Claims

Claims 1-77 (canceled)

78. (presently amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate;

a substrate on the plate comprising a plurality of contacts configured to electrically contact the pads; and

a clamping mechanism attached to the plate configured to bias the contacts and the pads together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and the substrate with the contacts in electrical contact with the pads; ~~and~~

each contact comprising a bump ~~comprising a metal deposited~~ on the substrate ~~and~~ having a height and a plurality of ~~spaced~~ raised portions ~~points having a height and comprising portions of the metal~~ dimensioned to penetrate into a pad to a penetration depth ~~equal to the height but~~ less than a thickness of the pad, the bump dimensioned to limit further penetration of the ~~points~~ raised portions into the pad at the force.

~~, the height and the penetration depth being from one half to two thirds of the thickness.~~

79. (currently amended) The apparatus of claim 78 wherein the bump is dimensioned to penetrate into the pad at a second force which is ~~about two to ten times~~ greater than the force.

80. (previously amended) The apparatus of claim 78 further comprising a plurality of conductive traces on the substrate in electrical communication with the contacts,

and a plurality of external contacts on the plate in electrical communication with the traces.

81. (currently amended) The apparatus of claim 78 wherein the substrate comprises silicon and the bump comprises metal.
~~height is about 5000Å.~~

82. (currently amended) The apparatus of claim 78 wherein the pads comprise ~~s~~ bondpads.

Claim 83 (withdrawn)

Claims 84-86 (canceled)

87. (currently amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate comprising a plurality of external leads;

a substrate on the plate comprising a plurality of contacts configured to electrically contact the pads; and

a clamping mechanism attached to the plate configured to bias the contacts and the pads together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and the substrate with the contacts in electrical contact with the pads;

each contact comprising a bump on the substrate having a height ~~comprising a metal~~ and a plurality of spaced points on the bump ~~having a height and comprising portions of the metal~~ configured to penetrate into a pad with a penetration depth ~~equal to the height but~~ less than a thickness of the pad while a remainder of the bump limits further penetration, ~~the height and the penetration depth being at least 5000Å but less than two thirds of the thickness,~~ the force selected to be greater than a first

force at which the points penetrate the pad but less than a second force at which the remainder of the bump penetrates the pad.
~~, the second force being from two to ten times the first force.~~

88. (currently amended) The apparatus of claim 87 wherein the substrate comprises silicon and the bump comprises metal.
~~height is 5000Å.~~

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Claim 89 (canceled).

90. (previously amended) The apparatus of claim 87 wherein the bump comprises a surface and the raised portions project from the surface.

91. (previously amended) The apparatus of claim 87 further comprising a plurality of bond pads on the conductive traces.

92. (currently amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate;

a substrate on the plate comprising a plurality of contacts configured to electrically contact the pads; and

a clamping mechanism attached to the plate configured to bias the contacts and the pads together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and the substrate with the contacts in electrical contact with the pads;

each contact comprising a bump having a height ~~surface~~ and a plurality of spaced raised portions ~~points comprising portions of the bump projecting from the surface~~

dimensioned to penetrate into a pad at the force by a penetration depth ~~equal to a height of the raised portions but~~ less than a thickness of the pad while the ~~surface~~ bump limits further penetration into the pad, ~~the height and the penetration depth being at least 5000Å but less than two thirds of the thickness,~~ the force selected to be greater than a first force at which the ~~points~~ raised portions penetrate the pad but less than a second force at which the bump penetrates the pad.

93. (previously amended) The apparatus of claim 92 further comprising a plurality of external leads on the plate in electrical communication with the contacts.

Claim 94 (withdrawn)

Claim 95 (canceled)

96. (previously amended) The apparatus of claim 92 wherein the raised portions comprise points.

97. (currently amended) An apparatus for testing a semiconductor die having a pad with a thickness comprising:

a plate;

a substrate on the plate comprising a contact configured to electrically contact the pad, the contact comprising a bump having a height, a surface and ~~at least one~~ a plurality of points comprising ~~a~~ portions of the bump projecting from the surface, ~~with a height of at least 5000Å,~~ the points and the surface configured such that the points can penetrate into the pad to a penetration depth ~~equal to the height but~~ less than ~~about two thirds of~~ the thickness while the surface limits further penetration into the pad; and

a clamping mechanism attached to the plate configured to bias the die and the substrate together with a force

selected to achieve penetration of the pad by the points to the penetration depth.
~~but to prevent damage to the pad by the bump.~~

98. (currently amended) The apparatus of claim 97 wherein the substrate comprises silicon and the bump comprises metal.
~~contact comprises a plurality of raised portions and the raised portions comprise pointed members.~~